

REMARKS

This amendment is responsive to the Office Action dated May 30, 2003. Applicant has amended claims 36, 38, 42, 45 and 50. Claims 36-55 are still pending.

Amendments to the Specification

Entry of the amendment to the paragraph on page 1, lines 27-23 is requested. In particular, Applicant identified a typo in the equation listed on page 1, line 30. The theoretical spot size is approximately given by the following equation:

$$SS = 0.57 \lambda / NA,$$

where λ is the wavelength of the laser, and

NA is the numerical aperture.

If requested by the Examiner, Applicant would be willing to identify supporting documentation that predates the current application to show that the spot size calculation approximately according to the equation $SS = 0.57 \lambda / NA$, was generally known and accepted in the art at the time of Applicant's invention.

Applicant's specification is drafted consistent with the correct equation listed above. For example, at page 2, lines 1-2, Applicant notes that a 350 nm laser with a 0.9 NA gives a spot size (SS) of 0.22 microns. In other words, $SS = 0.57 (.350 \text{ microns}) / (0.9) = 0.22 \text{ microns}$.

Applicant also requests entry of the amendment to the paragraph on page 18, line 27 to page 19, line 12. The amendment to the paragraph on page 18, line 27 to page 19, line 12 addresses an objection by the Examiner.

Claim Rejections Under 35 U.S.C. § 112, first paragraph

In the Office Action, the Examiner rejected claims 37, 40, 51 and 55 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. These rejections are improper. Applicant's specification provides written description support for all the features recited in claims 37, 40, 51 and 55.

The limitation of claims 37, 51 and 55 reciting a track pitch less than 1.6 multiplied by the spot size of the laser finds support in Applicant's specification at page 8, lines 19-21. Thus, the rejections of claims 37, 51 and 55 under § 112, first paragraph, should be withdrawn.

The limitation of claim 40 reciting that the flat master groove bottoms defining widths greater than 35 percent of the track pitch finds support in Applicant's specification at page 12, lines 20-22. Thus, the rejection of claim 40, under § 112, first paragraph, should be withdrawn.

The Examiner also appears to have rejected claim 47 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The limitation of claim 47 reciting transducer-detectable surface variations is described in great detail throughout pages 22 and 23. Accordingly, claim 47 complies with § 112, first paragraph.

Claim Rejections Under 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 36-53 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. To overcome this rejection, the Examiner requested that Applicant replace "photoresistive" with "photosensitive" in the first lines of claims 37 and 50. Applicant has made this amendment, as proposed by the Examiner. Examples of preferred photosensitive materials include photopolymers and photoresist. See page 12, lines 14-15.

With regard to claim 47, the Examiner appears to have rejected claim 47 under 35 U.S.C. 112, second paragraph, as being indefinite. The limitation of claim 47 reciting transducer-detectable surface variations is described in great detail throughout pages 22 and 23. In particular, pages 22 and 23 clearly identify the meaning of transducer-detectable surface variations, and even provide examples of shapes and sizes of exemplary transducer-detectable surface variations. Accordingly, one of ordinary skill in the art would have no difficulty in ascertaining the meaning of this term, particularly in light of Applicant's disclosure. Therefore, the rejection of claim 47 under 35 U.S.C. 112, second paragraph, is improper and should be withdrawn.

Claim Rejections Under 35 U.S.C. § 102 and § 103

In the Office Action, the Examiner rejected claims 36-42, 45-47, 50-52 and 54-55 under 35 U.S.C. 102(b) as being anticipated by Sugimoto (JP 01-023440); rejected claims 36-43, 44-52 and 54-55 under 35 U.S.C. 103(a) as being unpatentable over Sugimoto (JP 01-023.440) in view of Kashiwagi et al (EP 0,418,897); and rejected claims 36-55 under 35 U.S.C. 103(a) as being

unpatentable over Sugimoto (JP 01-023,440), in view of Kashiwagi et al. (EP 0418897) and Folger et al. '978 combined with Daecher et al. '829.

Applicant traverses all of these rejections. The applied references fail to disclose or suggest the features recited in Applicant's claims. In particular, the applied references fail to disclose or suggest a process of creating a desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size, as recited in Applicant's claims. The Examiner is clearly confusing the "groove widths" discussed in Sugimoto, with a *laser spot size* recited in Applicant's claims.

Applicant is NOT claiming the creation of a desired replica pattern defining a track pitch less than 2 multiplied by the groove width. Instead, Applicant's claims recite creation of a desired replica pattern defining a track pitch less than 2 multiplied by a *laser spot size*, which is not disclosed or suggested in any of the applied references. For this reason, all pending rejections should be withdrawn, and the claims allowed.

All of Applicant's pending claims recite the creation of a desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size. The prior art techniques disclosed in references cited by the Examiner simply do not achieve track pitches that are less than 2 multiplied by a spot size of the laser, nor do the references describe techniques for achieving such track pitches relative to a laser spot size.

In rejecting Applicant's claims, the Examiner stated that Sugimoto describes a master having a 1.1 micron grooves and a 1.6 micron pitch. The Examiner then stated that a 1.6 micron pitch divided by a 1.1 micron groove is 1.45, i.e., less than 2 and less than 1.6.

The mistake in the Examiner's analysis is that Applicant's claims do not recite a track pitch less than 2 multiplied by the *groove width*, as apparently perceived by the Examiner. Instead, Applicant's claims recite creation of a desired replica pattern defining a track pitch less than 2 multiplied by a *laser spot size*. Groove width is entirely different from laser spot size. Moreover, groove widths are affected by numerous other variables, and a particular laser spot size does not define groove widths independent of such other variables. For example, groove widths may be affected by laser intensity, the exposure time in which the laser exposes the photosensitive master, the thickness of the photosensitive material, the development time of the photosensitive material, and other variables. Laser spot size, on the other hand, is generally

accepted in the art to be defined as approximately spot size (SS) = $0.57 \lambda / \text{NA}$, where λ is the wavelength of the laser, and NA is the numerical aperture. Conventional techniques are generally limited, in that track pitches cannot be reduced to less than 2 multiplied by the spot size of the laser.

The clearest indication of the Examiner's misconstruction of Sugimoto relative to Applicant's claims is consideration of the actual laser spot sizes used in Sugimoto. Calculation of the actual laser spot sizes used in Sugimoto clearly proves that Sugimoto does not disclose the creation of a desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size. *Applicant encloses herewith an English translation of Sugimoto, as a courtesy to the Examiner.*

Again, the laser spot size is approximately given by the following equation:

$$\text{SS} = 0.57 \lambda / \text{NA},$$

where λ is the wavelength of the laser, and

NA is the numerical aperture.

Sugimoto discusses the use of Helium-Cadmium lasers and Argon lasers. At the time Sugimoto was filed, Helium-Cadmium lasers typically operated at a wavelength of 442 nanometers (.442 microns), and Argon lasers typically operated at a wavelength of 457 nanometers (.457 microns). Sugimoto discusses two different numerical apertures (NA), the first being 0.93 and the second being 0.70. As identified by the Examiner, the track pitch discussed in Sugimoto is 1.6 microns.

The use of Helium-Cadmium lasers or Argon lasers, and numerical apertures of 0.93 and 0.70, yield the following four potential spot sizes:

$$\text{SS} = 0.57 (.457) / 0.93 = 0.280 \text{ microns}$$

$$\text{SS} = 0.57 (.422) / 0.93 = 0.271 \text{ microns}$$

$$\text{SS} = 0.57 (.457) / 0.70 = 0.372 \text{ microns}$$

$$\text{SS} = 0.57 (.422) / 0.70 = 0.360 \text{ microns}$$

Clearly, the 1.6 micron track pitch discussed in Sugimoto is not less than (2) multiplied by any of the calculated laser spot sizes of 0.280 microns, 0.271 microns, 0.372 microns or 0.360 microns associated with the Sugimoto system. For this reason, Sugimoto does not disclose or suggest the features of Applicant's claims. Accordingly, all pending claims should be allowed.

None of the secondary references cited by the Examiner provide any teaching that would have led a person with ordinary skill in the art to recognize the features of Applicant's claims. In particular, none of the Applied references discloses or suggests a method comprising laser etching a photosensitive master to form a master pattern that is an inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching.

Applicant also continues to traverse the Examiner's position that "the language concerning a replica is intended use." Applicant's claims positively recite the formation of a master disk pattern that is the inverse of a desired replica pattern. Applicant is entirely confused as to why the Examiner continues to ignore this structural feature of Applicant's claims under the guise of "intended use."

As already discussed on the record, in the Interview Summary relating to the Examiner Interview of October 3, 2002, the Examiner stated:

The (E)xaminer has adopted the position that the language is somewhat akin to intended use and that one could pull a replica of a the useful optical recording medium directly off the resist image. *Interview Summary of Examiner Interview of October 3, 2002.*

This statement underscores the fact that the Examiner recognizes the structural differences between a pattern that is the same as a desired pattern, and a pattern that is an inverse of a desired pattern. In particular, the Examiner appears to acknowledge that an inverse of a desired pattern is different from the desired pattern in that when an inverse of the desired pattern is used, replicas can be created directly from the master (or with a second generation stamper), rather than using a first or third generation stamper. However, even though the Examiner recognizes that an inverse of a desired pattern is the exact opposite of the desired pattern, the Examiner rejects the claims based on unknown authority, using the phrase "intended use" as a substitute for a legitimate patentability analysis with respect to the claim limitation of defining on the master an inverse of a desired replica disk pattern.

Applicant's claimed techniques achieve highly desirable advantages that can be realized in any of a number of different laser etching systems having lasers of different spot sizes. In particular, the claimed technique defines track pitches less than 2 times the spot size of the laser, which can increase the storage density of replica disks formed using the master. Moreover, by

using Applicant's claimed laser etching technique, a laser etching system can be used to create media of improved storage density relative to the same system, if conventional mastering techniques are used instead. The prior art is simply devoid of any description of the features set forth in Applicant's claims, which require laser etching a photosensitive master to form a master pattern that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching. Moreover, the prior art provides no teaching that would have suggested the advantages of Applicant's claimed techniques and therefore no motivation for modification of conventional techniques.

Another example of claimed features not disclosed or suggested in the applied references is the ability to achieve flat groove bottoms of the master, since the pattern on the master is the inverse of the pattern of the replica disks, as set forth in claims 38, 42 and 50. In particular, claims 38, 42 and 50 recite etching down to a master substrate in combination with defining a pattern to be an inverse of a desired replica disk pattern, which can achieve flat coplanar groove bottoms that correspond to land tops on the replicas. This is particularly advantageous for flyable media applications. See claim 49 and advantages discussed e.g., at page 8, lines 16-18, and page 23, lines 15-24. Also, wide and flat lands with sharp corners may be achieved using the claimed process, which can improve tracking. See claims 42 and 50 and advantages discussed, e.g., at page 13, lines 12-13. These features and advantages are also not described in the applied references, particularly in the context of track pitches less than 2 multiplied by the laser spot size. Accordingly, claims 38, 42, 49 and 50 should be allowed for this additional reason.

Moreover, many of Applicant's dependent claims further quantify the sizes of the flat master groove bottoms and groove depths. See claims 39-40, 52 and 53. In particular, the claims recite that the flat master groove bottoms correspond to land tops of the replica, e.g., because the master pattern is the *inverse* of the desired replica disk pattern. In rejecting such claims, however, the Examiner cited references that do not even show flat master groove bottoms defined by a substrate interface, as recited in the claims. Clearly, flat master groove bottoms defined by a substrate interface are not shown in the context of track pitches less than 2 multiplied by the laser spot size. For this additional reason, claims 39-40, 52 and 53 further distinguish the Applied references.

CONCLUSION

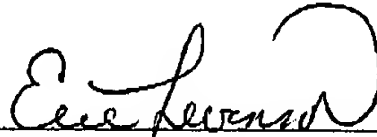
All of Applicant's pending claims recite laser etching a photosensitive master to form a master pattern that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching. None of the applied references discloses or suggests such an *inverse* laser etching technique that achieves such track pitches that are less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching. In the forgoing remarks, Applicant has not only shifted the burden of proof to the Examiner with respect to patentability of the pending claims, but has also mathematically proven the deficiencies of the applied references relative to the pending claims.

Accordingly, Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 00-0096. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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8/19/13

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